

AMENDMENT NO. 1 NOVEMBER 2014
TO
IS 3196 (PART 2) : 2006 WELDED LOW CARBON STEEL CYLINDERS
EXCEEDING 5 LITRE WATER CAPACITY FOR LOW PRESSURE LIQUEFIABLE
GASES

PART 2 CYLINDERS FOR LIQUEFIABLE NON-TOXIC GASES OTHER THAN
LPG — SPECIFICATION

(Fifth Revision)

(Page 1, clause 4.1) — Substitute the following for the existing clause:

‘4.1 The steel used in the manufacture of cylinders shall conform to IS 6240 or IS 15914.’

(Page 1, clause 4.1.1, third sentence) — Delete.

However, minimum percentage elongation value shall not be less than 25.

(Page 2, clause 6.2.1.2 a) first sentence) — Replace the following for the existing:

‘a) For cylindrical portion, greater of the following two for cylinders made out of steel conforming to IS 6240 and for cylinders made out of steel conforming to IS 15914 formula no. 1 is only applicable.’

(Page 2, clause 6.2.1.2) — Insert the following new clause:

‘6.2.1.3 For the cylinders made out of steel conforming to IS 15914 the minimum wall thickness of the cylindrical shell, t , and of the end, t_e , shall be not less than the value derived from any of the following formulae:

a) for $D_o < 100$ mm:
 $t_{\min} = t_e_{\min} = 1.1 \text{ mm} \dots \dots$ (1)

b) for $100 \text{ mm} < D_o < 150$ mm:
 $t_{\min} = t_e_{\min} = 1.1 + 0.008(D - 100) \text{ mm} \dots \dots$ (2)

c) for $D_o > 150$ mm:
 $t_{\min} = t_e_{\min} = (D/250) + 0.7 \text{ mm}$
(with a minimum of 2 mm) $\dots \dots$ (3)

(Page 7, clause 11.1) — Insert the following new clause:

‘11.2 Cylinder manufactured from the steel conforming to IS 15914 shall be normalized (*see 3.1*) as per the material standard.’

(Page 9, clause 18.1.5) — Insert the following new clause:

‘18.2 Additional Test

18.2.1 For cylinders manufactured from the steel as per IS 15914 additional test such as cylinder body integrity impact test and drop test shall be carried out as per Annex C. These tests shall be considered as type test.’

(Page 11, Annex A) — Insert the following at the end:

‘15914 : 2011 High tensile strength flat rolled steel plate (up to 6 mm) sheet and strip for the manufacture of welded gas cylinder

Price Group 3
Amendment No. 1 to IS 3196 (Part 2) : 2006

16054 : 2013 Periodic inspection and testing — welded Low carbon steel cylinders exceeding 5 litre water capacity for Liquefied Petroleum Gas (LPG) — Code of Practice’.

(Page 11, Annex B) — Insert the following new Annex C and renumber subsequent annex:

‘ANNEX C
(Clause 18.2.1)

C-1 CYLINDER BODY INTEGRITY IMPACT TESTS

C-1.1 General

The ability of the cylinder design (thickness, materials and mechanical properties) to withstand loadings other than internal pressure shall be demonstrated by a series of impact tests.

Each type of test shall be carried out on cylinder without internal pressure and cylinders pressurized to $P_t/1.2$.

The specified impact energy and striking velocity shall be achieved by striking the test cylinder with a moving striker or by dropping the cylinder from an appropriate height in all cases, the location of the impact shall be as specified in the test procedure and the direction of impact shall intersect with the axis of the cylinder.

The strikers (flat surface and edge) shall be of metallic material having a hardness higher than that of the cylinder and sufficiently robust to prevent the impact energy being absorbed by deflection of the striker.

C-1.2 Flat Surface Impact Test

C-1.2.1 Procedure

The striker shall be a flat surface with a length equal to the overall cylinder length and width equal to the cylinder diameter.

The impact energy, F , shall be determined by:

$$F = 30 M$$

where

F = energy, in Joules; and

M = maximum operating mass of the cylinder, in kg.

The striking velocity shall be between 7 m/s and 8 m/s.

Two un-pressurised cylinders shall each be impacted with the surface parallel to the cylinder. The cylinders shall then be impacted on the shoulder of the end, with the surface at 45 to the cylinder axis (*see* Fig. 3).

On completion of both impacts, the cylinders shall be visually examined for signs of damage and assessed against the rejection criteria established in accordance with IS 16054 : 2013.

If both cylinders show damage equal to or worse than these rejection criteria, then on completion of both impacts, both cylinders shall be subject to a burst test in accordance with **17.3**.

If the cylinder withstand any of the impacts with visible damage below the rejection criteria, or if the rejection criteria have not been established, then on completion of both impacts, one cylinder shall be subject to the burst test in accordance with **17.3** and the other subject to a fatigue test in accordance with **17.2**.

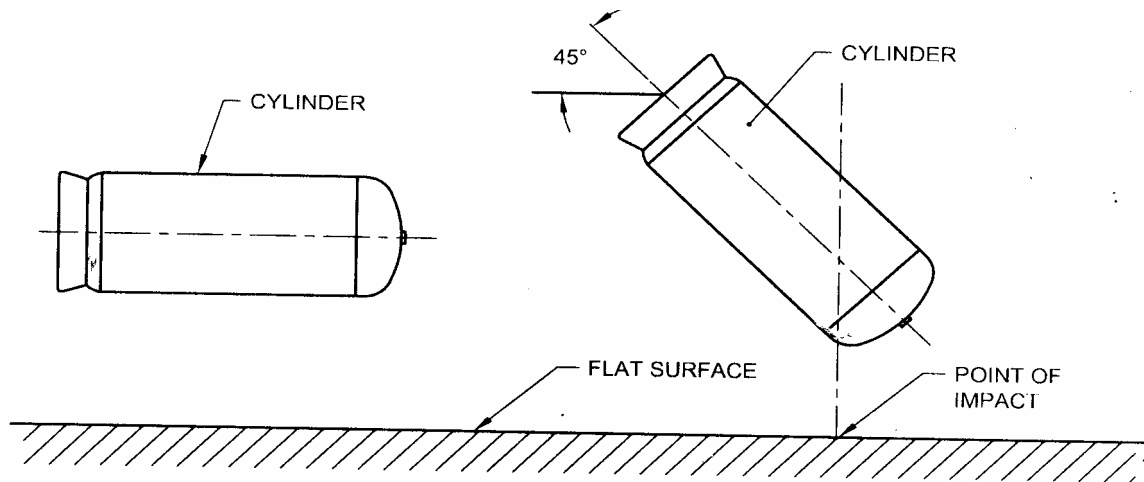


FIG. 3 IMPACT TEST WITH FLAT SURFACE

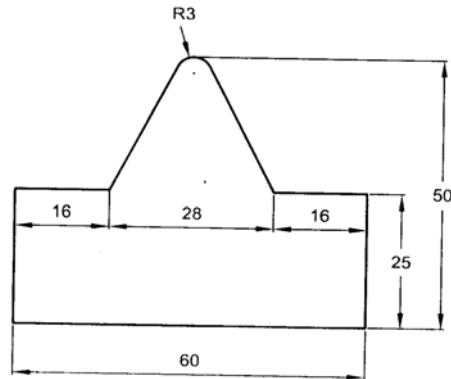
C-1.2.2 Requirement

- a) After impacts, the pressurised cylinders shall not leak.
- b) Cylinders subject to the burst test shall meet the requirements of 17.3.
- c) Cylinders subject to the fatigue test shall meet the requirements of 17.2.

C-1.3 Edge Impact Test

C-1.3.1 Procedure

The profile of the striker shall be as shown in Fig. 4 and the length shall be as shown in Fig. 5.



All dimensions in millimeters.

FIG. 4 STRIKER PROFILE

The impact energy, F , shall be determined by:

$$F = 12M$$

where

F = energy, in joules; and

M = maximum operating mass of the cylinder, in kg.

The striking velocity shall be between 4 m/s and 5m/s.

Amendment No. 1 to IS 3196 (Part 2) : 2006

Two un-pressurised cylinders shall each be impacted with the edge parallel to the cylinder axis (*see* Fig. 5). The cylinders shall then be impacted with the edge perpendicular to the cylinder axis (*see* Fig. 6). The position of the two impacts shall be separated by a minimum of 45° round the cylinder circumference.

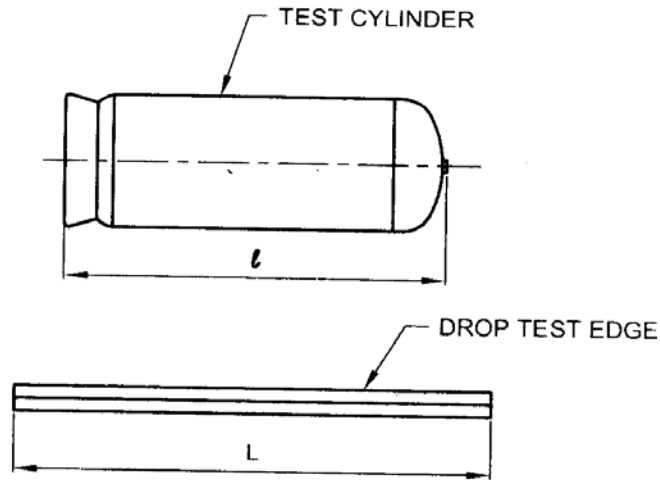


FIG. 5 IMPACT TEST WITH CYLINDER AXIS PARALLEL TO EDGE, L

On completion of both impacts, the cylinders shall be visually examined for signs of damage and assessed against the rejection criteria established in accordance with IS 16054 : 2013.

If both cylinders show damage equal to or worse than these rejection criteria, then on completion of both impacts, both cylinders shall be subject to a burst test in accordance with **17.3**.

If the cylinders withstand any of the impacts with visible damage below rejection criteria, or if the rejection criteria have not been established, then on completion of both impacts, one cylinder shall be subject to a burst test in accordance with **17.3** and the other subject to a fatigue test in accordance with **17.2**.

The test shall be repeated with two further cylinders, which have been pressurised to $P_t/1.2$.

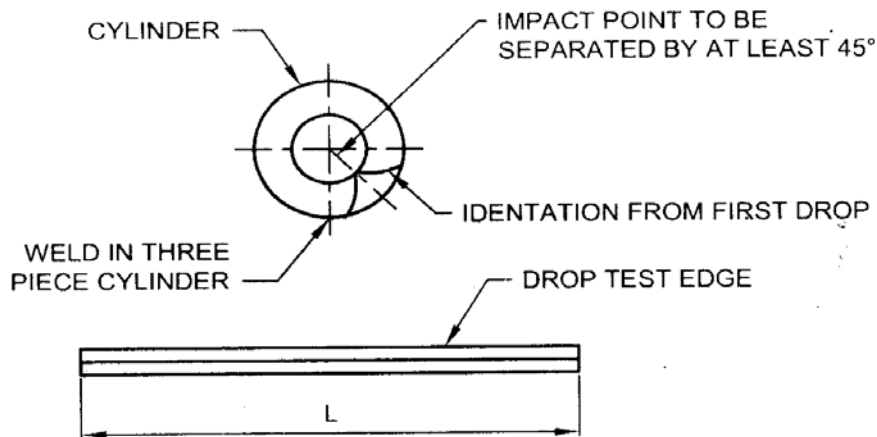


FIG. 6 IMPACT TEST WITH AXIS PERPENDICULAR TO EDGE, L

C-1.3.2 Requirement

- a) After impacts, the pressurised cylinders shall not leak.
- b) Cylinders subject to burst test shall meet the requirements of **17.3**.
- c) Cylinders subject to the fatigue test shall meet the requirements of **17.2**.

C-2 DROP TESTS**C-2.1 Procedure**

Two finished cylinders, including any foot-ring and/or valve protection, shall be weighted to represent the maximum operating mass and pressurised to $P_v/1.2$.

The cylinders shall each be dropped twice into a flat surface from 1.2 m, in each of the five different orientations illustrated in Fig. 7 that is, 10 drops per cylinder.

The surface shall consist of a steel plate, 10 mm thick, sufficiently flat so that the difference between any two points on the surface is no more than 2 mm. It shall be replaced if the surface no longer meet this requirement. The plate shall rest on a flat, smooth concrete bed, at least 100 mm thick. The plate shall be in full contact with the concrete so that it is fully supported.

After each drop, the cylinders shall be visually examined for signs of damage and assessed against the rejection criteria established in accordance with IS 16054 : 2013.

If both cylinders show damage equal to or worse than these rejection criteria, then on completion of all ten drops, both cylinders shall be subject to a burst test in accordance with **17.3**.

If the cylinders withstand any of the drops with visible damage below the rejection criteria, or if the rejection criteria have not been established, then on completion of all ten drops, one cylinder shall be subject to a burst test in accordance with **17.3** and the other subject to a fatigue test in accordance with **17.2**.

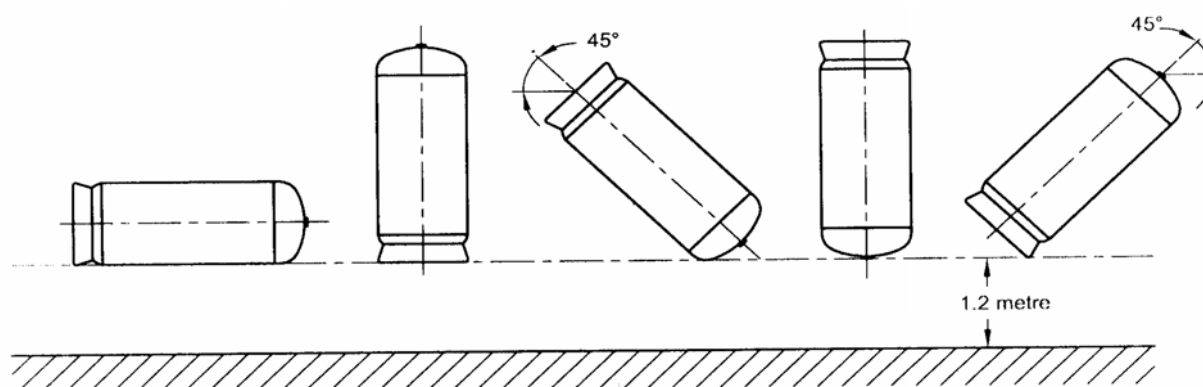


FIG. 7 ORIENTATION FOR 1.2 m DROP ONTO FLAT SURFACE

C-2.2 Requirement

- a) After ten drops, the cylinders shall not leak.
- b) Cylinders subject to the burst test shall meet the requirement of **17.3**.
- c) Cylinders subject to the fatigue test shall meet the requirements of **17.2**.

(MED 16)